

STEP II, 2014, Q1 EC

Question 1

While the first part of the question was successfully completed by many of the candidates, there were quite a few diagrams drawn showing the point P further from the line AB than Q. Those who established the expression for $x \cos \theta$ were usually able to find an expression for $x \sin \theta$ and good justifications of the quadratic equation were given. The case where P and Q lie on the lines AC produced and BC produced caused a lot of difficulty for many of the candidates, many of whom tried unsuccessfully to create an argument based on similar triangles.

The condition for (*) to be linear in x did not cause much difficulty, although a number of candidates did not give the value of $\cos^{-1}\left(-\frac{1}{2}\right)$. Many candidates realised that the justification that the roots were distinct would involve the discriminant, although some solutions included the case where the discriminant could be equal to 0 were produced. However, very few solutions were able to give a clear justification that the discriminant must be greater than 0.

In the final part some candidates sketched the graph of the quadratic rather than sketching the triangle in the two cases given. In the second case many candidates did not realise that Q was at the same point as C.



NextStepMaths.com

To view mark schemes, fully worked solutions and examiner's comments, and for more details about tutoring and other services offered, go to NextStepMaths.com